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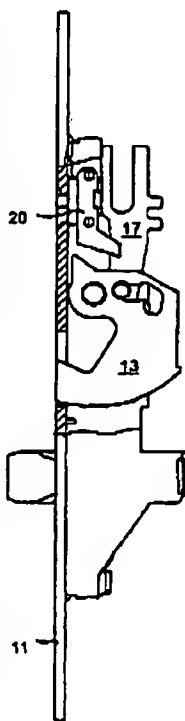
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(54) Title: LOCK DEVICE WITH THUMB TURN LATCH



(57) Abstract: A lock arrangement that has a thumb turn latch includes a lock case that houses a key-operated follower unit and a thumb-turn operated thumb turn unit. A bolt (13) is movable between an inner and an outer end position by means of the action of the follower unit and the thumb turn unit through the medium of a link arrangement (17). A switching element (20) is coupled mechanically to the thumb turn unit for deactivation of the thumb turn function, by moving the switching element from a starting position of a latching position. The bolt includes a restoring part (13c) which functions to exert force on a contact surface (23a) of the switching element, such as to move the switching element to its starting position when the bolt is moved from its inner to its outer end position. As a result, it is impossible to determine whether the thumb turn latching function has been activated by studying the lock arrangement from an external position.

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ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,  
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GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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**LOCK DEVICE WITH THUMB TURN LATCH****FIELD OF INVENTION**

- 5     The present invention relates generally to a lock device and more particularly to a lock device that includes a thumb turn latch that can be operated from the forend side.

**BACKGROUND OF THE INVENTION**

- 10    Many house locks and apartment locks for instance, include a lock cylinder and a lock bolt that can be brought to a locked or unlocked state with the aid of a key from inside and outside the door to which the lock is fitted, and a thumb turn that is mounted on the inside of the door and that has the same function as the key. The purpose of the thumb turn is to enable the lock to be brought to a locked and unlocked state without needing to use a key.

- 15    One drawback with this solution is that a person who has unlawfully obtained access to the inside of the door, for instance through a window, can easily unlock the door by means of the thumb turn and then leave the room through the normal exit.

- 20    Locks that include a so-called thumb turn latch are known to the art. With this solution, a person in the possession of a valid key, for instance the owner of an apartment, is able to latch the thumb turn function and thereafter use the key to lock the door. Anyone located on the inside of the door is then unable to leave the room through the locked door, and must therefore find another exit.

- 25    In the case of some known locks of this nature, the thumb turn latch is activated by means of a switching element on the forend side of the lock, wherein the switching element is moved to a specific position in which said latch is activated, prior to locking the door with the key. One drawback with this known solution, however, is that a person who intends to enter locked premises unlawfully other than through the door, can determine whether or not the latch has been activated, by peering through the crack in the door and therewith determining the position of the switching element. A further drawback with known thumb turn latches is that their function contributes significantly to the number of lock components, resulting in higher costs both with respect to manufacture and with lock assembly/fitting.
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Accordingly, a problem resides in the provision of a lock arrangement that includes a thumb turn latch with which it cannot be seen whether or not the latch has been activated, and also which is both simple and inexpensive in manufacture.

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#### SUMMARY OF THE INVENTION

An object of the present invention is to provide a lock arrangement that includes a thumb turn latch that functions in a manner to prevent it from being seen whether or not the latch has been activated, from outside the door.

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Another object of the invention is to provide a lock arrangement that comprises few components and includes a thumb turn latch and that can therefore be manufactured both simply and inexpensively.

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The invention is based on the realisation that a lock bolt can be designed so that the latch-activating element will be returned to its original position.

Thus, an inventive lock arrangement comprises the features defined in the accompanying Claim 1.

20

Further preferred embodiments are defined in the dependent Claims.

The aforesaid drawbacks with known lock technology are avoided with the lock arrangement according to the present invention. The inventive lock arrangement includes a bolt which when the door is locked from the outside functions to return the thumb turn latch switching element to its original position, therewith making it impossible to discern whether or not the latch has been activated solely from outside the door. Moreover, there is provided a thumb turn latching function that requires only very few additional parts.

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#### BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail by way of example and with reference to the accompanying drawings, in which

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Fig. 1 is a perspective view of a lock arrangement according to the present invention;

Fig. 2 is an exploded perspective view of a lock arrangement according to the present invention;

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Fig. 3 is a side view of a forend unit included in the lock arrangement according to the invention;

Figs. 3a-c are side views of a switching element and bolt in respective different positions;

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Fig. 4a is a perspective view of a latch plate included in the lock arrangement according to the invention;

Fig. 4b illustrates the latch plate fitted to a lock case;

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Figs. 5a and 5b are respectively a plan view and an exploded perspective view of a thumb turn included in the lock arrangement according to the invention; and

Figs. 6a and 6b are plan views of the units included in the inventive lock arrangement, which detail the thumb turn latching function of the lock arrangement.

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#### DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

A preferred embodiment of a lock arrangement and a forend unit according to the invention will now be described. Reference is made in the following description to different directions, such as up, down, left, right, etc. These directions shall not be seen as limiting the invention, but shall be understood as simply referring to what is shown in the various figures.

Fig. 1 is a perspective view of an inventive lock arrangement, with the cover plate removed, and Fig. 2 is an exploded view of said arrangement. The lock arrangement includes a forend unit 10 and a forend or post 11 and a bar 12 of U-shaped cross-section welded to the forend 11. The U-bar encloses all lock functions close to the front of the lock, such as controlling and operating a bolt 13 in the form of a pivotal hook bolt, and a

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latch bolt 14. The forend unit 10 will be described more precisely below, with reference to Fig. 3.

- The lock arrangement also includes a housing consisting of a case 15 and a cover plate 16.
- 5 These components are in mirror image to one another, with otherwise identical parts that are fitted to the U-bar 12 by means of anchoring elements. The lock arrangement includes in said housing follower units or follower modules, in the illustrated case a cylinder follower unit 30, a handle follower unit 40, and a thumb turn unit 50. The thumb turn unit will be described more specifically below with reference to Figs. 5a and 5b. The follower
- 10 units and the thumb turn unit are mounted between the case 15 and the cover plate 16 by means of pins and screw-on sleeves. A lock cylinder 31 is fitted to the cylinder follower unit 30 and a thumb turn 51 is fitted to the thumb turn unit 50. Although not shown, a handle is fitted to the handle follower unit 40 (Fig. 2).
- 15 The cylinder follower unit 30 includes a stud 31 which is coupled mechanically to a guide element 17 which is coupled to the bolt 13 and which controls movement of the bolt between an unlocked and locked position. Fitted between the cylinder follower unit 30 and the thumb turn unit 50 is a rack 70, whereby movement of the bolt can also be controlled via the thumb turn unit.
- 20 The function of the forend unit and the follower units are described in more detail in Applicant's pending patent applications SE 0103247-3 and SE 0103443-8, these applications being included in the present document by way of reference.
- 25 The forend unit 10 also includes a switching element which is guided in grooves 12a, 12b in the U-bar and which includes an outwardly projecting part 21 which can be manoeuvred by a finger inserted through an opening 11a in the forend or post 11. The switching element can be moved vertically between an upper and a lower end position, of which the upper position is shown in Figs. 1 and 2. The switching element functions so that when
- 30 moved from its upper to its lower position, it activates a thumb turn latch which deactivates the function of the thumb turn unit 50, in other words it is no longer possible to influence the position of the hook bolt 13 by means of a thumb turn 51 coupled to the thumb turn unit 50 (see Fig. 2). The switching element and its co-action with the hook bolt 13 will now be described more specifically with reference to Fig. 3 and Figs. 3a-c.

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The switching element 20 is made of plastic and in addition to the outwardly projecting part 21 also includes a body 22 which is terminated at its bottom with an oblique contact part 23 whose underside presents a sloping contact surface 23a, as will be seen from Fig. 3a. Each side of the body 22 that faces towards a respective side of the U-shaped bar includes a bevelled bead 22a, 22b, said beads running in grooves 12a, 12b in the U-bar. The bevel on respective beads enables the switching element 20 to be readily pressed into the U-bar when fitting said element, wherewith the sides of said switching element spring inwards so as to enable the element to snap firmly into position.

10 The switching element also includes an outwardly projecting tailpiece 24 which is adapted for co-action with a latch plate 60, as will be described in more detail below with reference to Figs. 4a and 4b.

15 The hook bolt 13 is hinged about a point 13a and is able to pivot between a position in which is locked from the inside, shown for example in Fig. 3, and a position in which it is locked from the outside, shown in Fig. 3c. The bolt is guided forcibly by means of the vertically movable guide element 17, which includes on either side a projection 17a that runs in a respective groove 13b in the hook bolt. The guide element is, in turn, coupled to the stud 31 of the cylinder follower unit 30 (see Fig. 2) therewith guiding said unit 30.

20 Finally, the hook bolt 13 includes a restoring part in the form of a beak-like portion 13c which faces upwards towards the switching element 20 and whose function will now be described.

25 Figs. 3 and 3a show the switching element in its upper position, which is its normal position. In this position, the switching element is spaced from the restoring part of the hook bolt and the hook bolt is thus able to pivot between its inside-locked and its outside-locked positions without actuating the switching element. As before mentioned, when activating the latching function of the thumb turn latch, the switching element 20 is moved from its upper position to its lower position, shown in Fig. 3b, with the aid of a finger. The contact surface 23a of the switching element will therewith come into contact with the restoring part 13c of the hook bolt. The switching element 20 remains in this lower position until the hook bolt 13 is manoeuvred from its inside-locked position to its outside-locked position, by inserting a key into the lock cylinder 31 coupled to the cylinder

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follower unit 30. During this movement of the switching element, the tip of the restoring part 13c slides over the contact surface 23a of the switching element therewith pressing the switching element up into its upper position, as shown in Fig. 3c.

- 5 Because the switching element is returned to its upper position as the door is locked from the outside, so-called outside-locking, the problem of whether it is possible to determine from the position of the switching element 21 whether or not the thumb turn latch has been activated is eliminated. Moreover, the switching element 20 in the position shown in Fig. 3c, i.e. with the bolt locked from the outside, is fixated in its upper position by the  
10 restoring part 13c of said bolt. This is an advantage, since it is not possible to activate the thumb turn latching function in this position.

- As earlier mentioned, the switching element co-acts with a latch plate, shown in detail in Fig. 4a. The latch plate 60 is comprised of a generally flat plate 61 on which a plastic  
15 element 62 is mounted. The plate includes a bent tongue 63, which is influenced by tailpiece 24 of the switching element 20. This will be evident from Fig. 4b, which shows the latch plate mounted in the lock case, with the lower position of the switching element 20 indicated in broken lines. The plate 61 is also bent to form snap-in fastener parts for accommodation of the plastic element 62. The lower end-part 65 of the plate 61 is  
20 configured for engagement with the thumb turn unit for the purpose of latching said unit, as described hereinafter.

- The plastic element 62 includes two resilient arms 63, 64. The right-hand arm 64 has a rounded recess 64a such that the arm defines an essentially round opening for receiving a  
25 case-carried pin 15a. This defines the lower latching end position of the latching plate. This will be explained in more detail below with reference to Figs. 6a and 6b.

- Figs. 5a and 5b illustrate the thumb turn unit 50 included in the lock arrangement. The thumb turn unit includes a plastic case or box 52 which has a lid or cover 52a formed  
30 integrally therewith. The lid is intended to be snapped firmly into a closed state subsequent to having mounted relevant components in the box, and is provided to this end with holes that co-act with outwardly protruding box-carried members. Both the box bottom and lid 52a include round openings 52b in which a thumb turn hub 53 is mounted with the aid of an appropriate bearing. The hub 53 is spring-biased by means of a coil spring 54 disposed



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around the bearing and includes a latch recess 53a which faces upwards towards the lower end 65 of the latch plate in the rest position of the hub.

5 The arrangement also includes a toothed ring 55, which is mounted by bearing means on the end of the hub distal from the spring. The toothed ring has a toothed portion 55a intended for engagement with the rack 70, see Figs. 6a, 6b. Arranged around a part of the periphery of the central opening of the toothed ring 55 is a recess 55b whose width is larger than a shoulder 53b on the thumb turn hub. This provides rotational play between hub 53 and ring 55, therewith enabling the toothed ring to work freely from the hub and  
10 under the influence of the rack.

The functional operation of the thumb turn latch will now be described in more detail with reference to Figs. 6a and 6b. Because the switching element 20 has been moved to its lower position, the latch plate 60 will have been moved to its latching position by virtue of  
15 the co-action between the tailpiece 24 of the switching element and the bent tongue 63 on the latch plate. The right-hand arm 64 of the plastic element grips around the pin 15a in this position, therewith holding the latch plate in said position even should the switching element 20 be returned to its upper position. The lower end-part 65 of the latch plate therewith engages the recess 53a of the thumb turn hub 53, so as to prevent rotation of the  
20 hub. The thumb turn latch is therewith activated.

In this position, the hook bolt can thus only be actuated by means of the cylinder follower unit 30 through the medium of a link arrangement (not shown) coupled to the stud 31 on the cylinder follower unit, which is vertically movable. As a result of the rotational play or  
25 clearance between the thumb turn hub and the rack made possible by the shoulder 53a and the recess 55a, see Figs. 5a, 5b, the rack 70 is able to move vertically even though the thumb turn latch is activated. The functional operation of the cylinder follower unit 30 is thus not latched by the thumb turn latching function.

30 When locking the bolt from the outside by means of a key, the switching element 20 is returned to its upper position, as described above with reference to Fig. 3 and Figs. 3a-c.

The rack 70 includes an outwardly protruding restoring part 71, which is intended to interact with the left-hand arm 63 of the plastic element. When locking the bolt from the outside,

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the rack is moved to its lower end position and presses the resilient left-hand arm 63 away as it moves downwards. Upon completion of said movement, the arm returns to its rest position, whereby the restoring part is located beneath the lower tip of the left-hand arm 63 as shown in Fig. 6b. When the bolt is locked from the inside, the latch plate 60 is caused to  
5 accompany movement of the rack as the rack is moved towards its upper end position by virtue of the restoring part 71 pressing upwards against the arm 63. When locking of the bolt has been completed, the rack and the latch plate will be located in the position shown in Fig. 6b and the thumb turn latch facility will have been maintained.

10 Although preferred embodiments of an inventive lock arrangement and its associated forend unit have been described in the foregoing, it will be understood by the person skilled in this particular technical field that variations can be made within the scope of the accompanying Claims. For example, other types of bolts, such as straight bolts can be used in a lock arrangement constructed in accordance with the invention.

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Moreover, the choice of specific materials has been proposed. It will be understood, however, that the plastic material may be replaced with some other material. For example, the switching element 20 may be comprised of metal sheet or the housing of the thumb  
turn unit 50 may be comprised of zinc, for example.

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**CLAIMS**

1. A lock arrangement comprising
  - a lock housing (12, 15, 16) which houses
  - 5 - a key-operated follower unit (30);
  - a thumb turn manoeuvred thumb turn unit (50);
  - a bolt (13) which is mounted in the lock housing for movement between an inner and an outer end position under the action of said follower unit and said thumb turn unit through the medium of a link arrangement (17, 31); and
  - 10 - a switching element (20) which is coupled mechanically to said thumb turn unit for deactivation of its function by moving said switching element from a starting position to a latching position,

characterised in that

  - said bolt includes a restoring part (13c) which is intended to exert force on a contact
  - 15 surface (23a) of said switching element such as to move said switching element to its starting position when the bolt is moved from its inner end position to its outer end position.
2. The lock arrangement according to Claim 1, wherein the contact surface (23a) is
- 20 disposed on a sloping underside of said switching element (20).
3. The lock arrangement according to Claim 1 or 2, wherein said bolt is a pivotal bolt (13).
- 25 4. The lock arrangement according to any one of Claims 1-3, wherein said restoring part (13c) functions to block movement of said switching element (20) to its latching position when said bolt is located in a locking position.
5. The lock arrangement according to any one of Claims 1-4, comprising
- 30 - a rotatable thumb turn hub (53) which can be manoeuvred by means of a thumb turn, said hub including a recess (53a); and further comprising
- a latching element (60), which is movable between a release position and a latching position in which the latching element engages said recess in the thumb turn unit.

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6. The lock arrangement according to Claim 5, wherein the switching element (20) includes a part (24) that drives the latching element (60) to its latching position as the switching element is moved to its latching position.
- 5 7. The lock arrangement according to Claim 5 or 6, wherein said latching element (60) includes a first resilient arm (64) which functions to lock the latching element in its latching position.
8. The lock arrangement according to any one of Claims 1-7, comprising a rack (70)  
10 which is coupled operationally between the follower unit (30) and a rotatable toothed wheel (55) on the thumb turn unit (50).
9. The lock arrangement according to Claim 8, wherein the latching element (60) includes a second resilient arm (63), and wherein the rack (70) includes an engagement  
15 part (71) which functions to move said latching element to its release position when the bolt is moved from its outer end position to its inner end position.
10. The lock arrangement according to Claim 8 or 9, wherein the thumb turn hub (53) includes a shoulder and said toothed ring (55) includes a recess (55b) that has a peripheral  
20 extension that is larger than said shoulder, thereby providing rotational clearance or play between said hub and said toothed ring.

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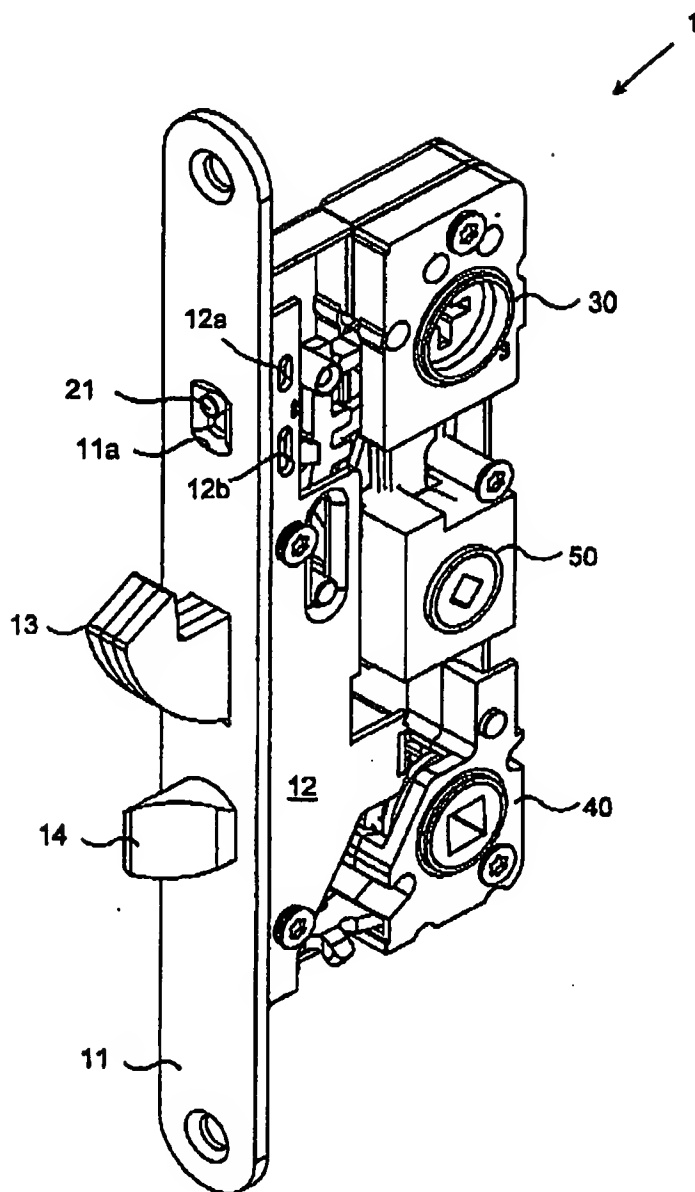


Fig. 1

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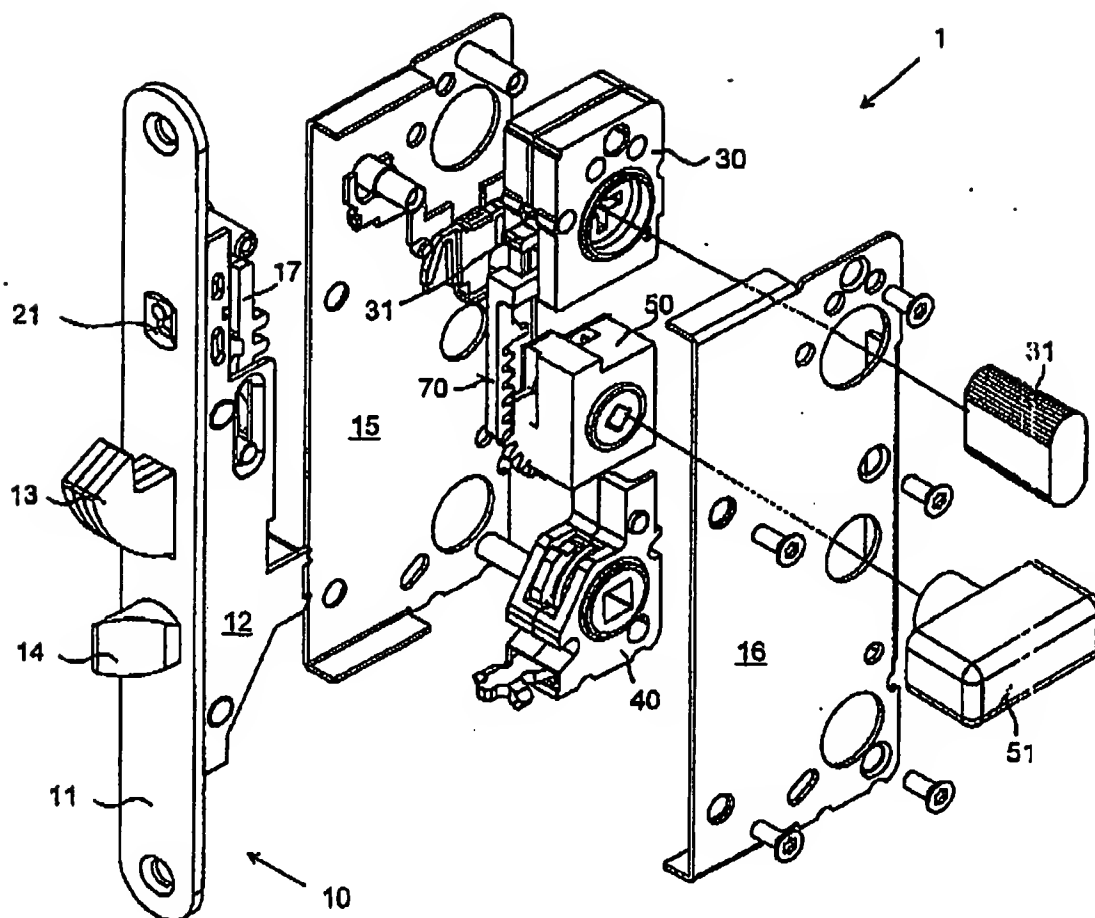


Fig. 2

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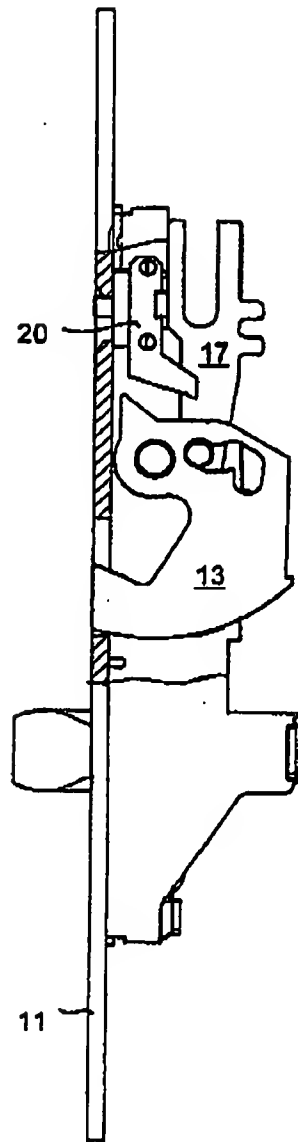


Fig. 3

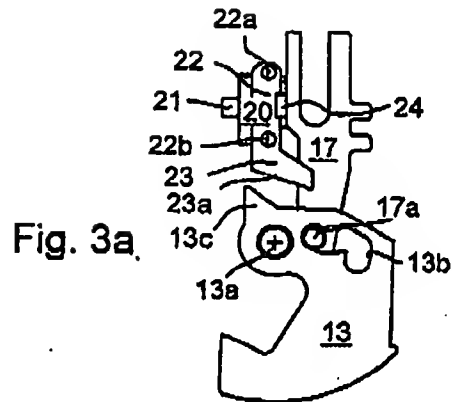


Fig. 3a

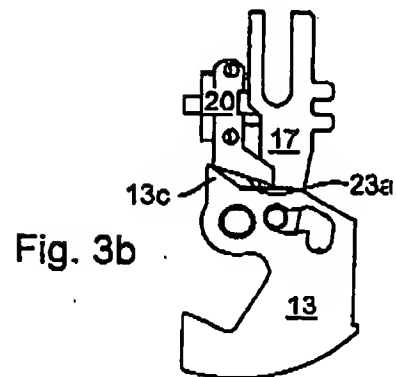


Fig. 3b

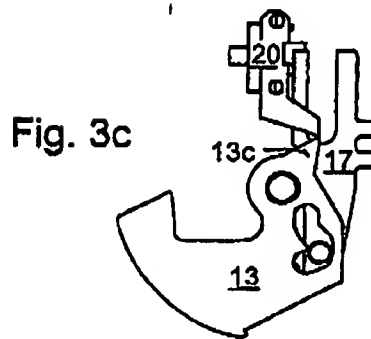


Fig. 3c

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Fig. 4a

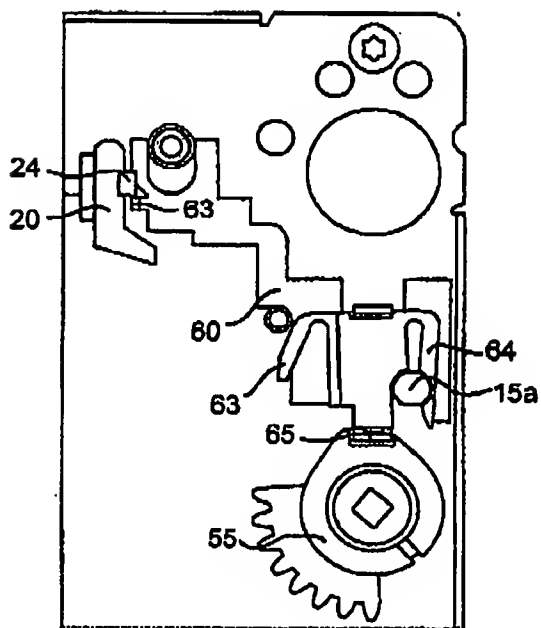
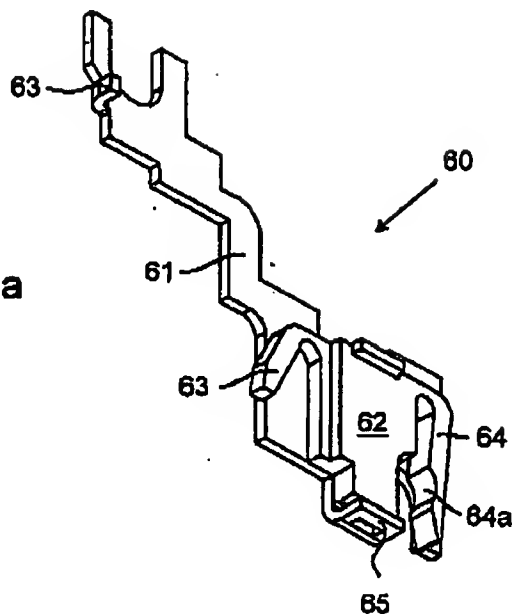


Fig. 4b



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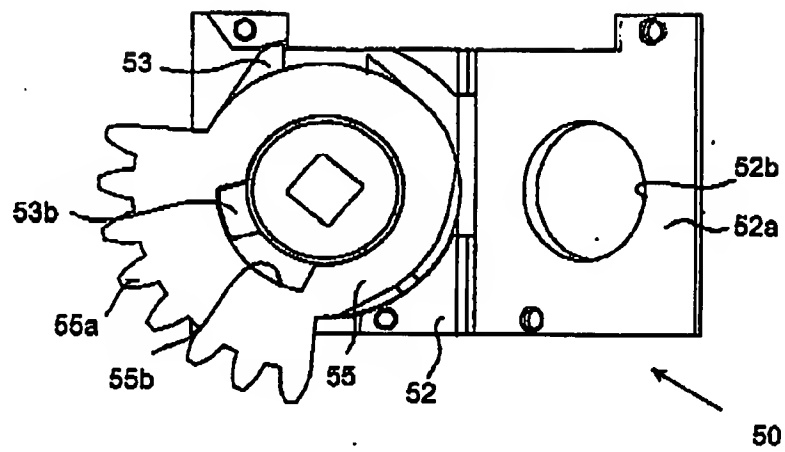


Fig. 5a

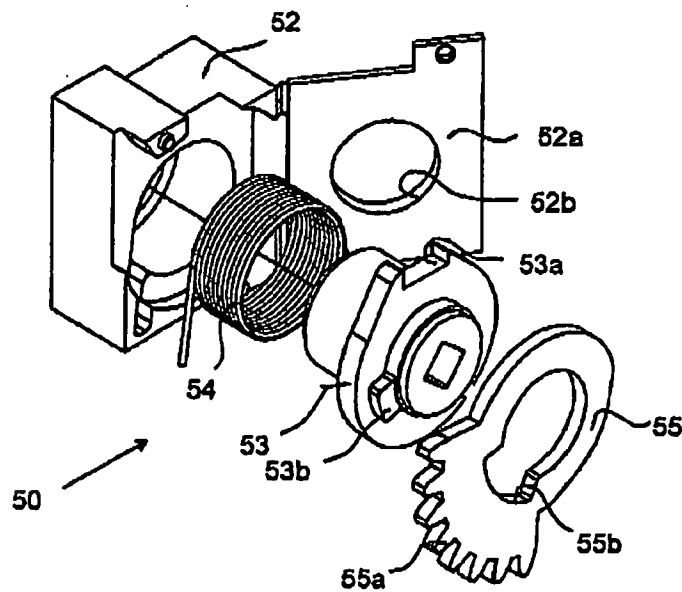


Fig. 5b

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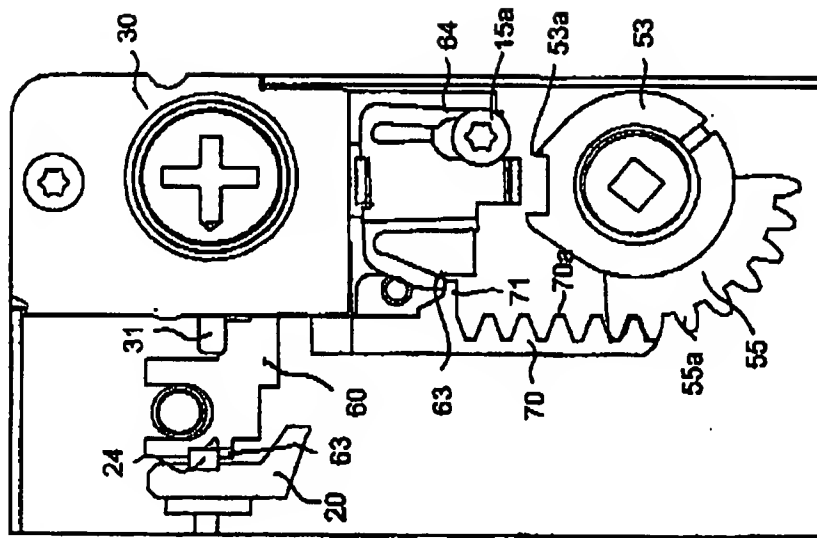


Fig. 6b

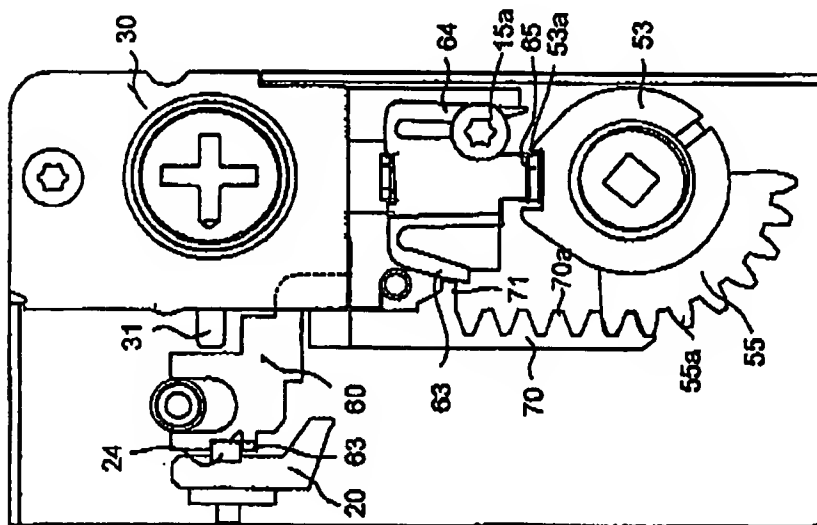


Fig. 6a

## INTERNATIONAL SEARCH REPORT

International application No.  
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<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
<b>IPC7: E05B 13/00, E05B 59/00</b> According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
<b>IPC7: E05B</b>		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
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<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3672714 A (J. SCHULTZ), 27 June 1972 (27.06.72)	
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A	US 948201 A (C.A. BERRY), 1 February 1910 (01.02.10)	
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A	US 4674776 A (P. JAMES), 23 June 1987 (23.06.87)	
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<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
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